

Dr. L. RUBY LEUNG

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EDUCATION

B.S. (Honors)	Physics & Statistics, Chinese University of Hong Kong	1984
M.S.	Atmospheric Science, Texas A&M University	1988
Ph.D.	Atmospheric Science, Texas A&M University	1991

WORK EXPERIENCE

Research Assistant	Texas A&M University	1986-1991
Research Associate	Pacific Northwest National Laboratory	1991-1992
Senior Scientist	Pacific Northwest National Laboratory	1992-2001
Staff Scientist	Pacific Northwest National Laboratory	2001-2004
Laboratory Fellow	Pacific Northwest National Laboratory	2004-present
Affiliate Scientist	National Center for Atmospheric Research	2004-present

RESEARCH EXPERIENCE

Dr. Leung is a recognized leader in regional climate modeling. She has been actively involved in development and applications regional climate models. She has applied regional and global climate models and hydrology models to understand the impacts of climate variability and change on water resources in the U.S. and East Asia. Dr. Leung's research on climate change impacts has been featured in *Science*, *Popular Science*, *Wall Street Journal*, *National Public Radio*, and many major newspapers. She develops subgrid cloud parameterizations to represent the influence of subgrid-scale terrain variations on orographic precipitation, and turbulence and cloud-radiation interaction effects on stratocumulus clouds. Through the development of the subgrid orographic precipitation scheme, she developed a unique framework for coupling atmospheric, land surface, and ecosystem processes to improve simulations of hydrologic and ecologic processes over mountain watersheds. More recently, Dr. Leung develops and applies regional climate models to study extreme weather/climate and the influence of aerosols and land-atmosphere interactions on the water cycle. She has been leading the community efforts to develop a next generation regional climate model based on the Weather Research and Forecasting (WRF) model for upscaling and downscaling and modeling of earth system interactions at the regional scale. Dr. Leung has published over 90 peer-reviewed papers and book chapters. She has been session chairs and invited speakers in many workshops and conferences.

PROFESSIONAL MEMBERSHIPS

American Meteorological Society
American Geophysical Union
American Association for the Advancement of Science

AWARDS AND HONORS

Fellow, American Meteorological Society (AMS)
Fellow, American Association for the Advancement of Science (AAAS)
Distinguished Paper Award, 2002 International Conference on Intelligent User Interfaces, January 13-16, San Francisco, CA.
Outstanding Performance Award, Fundamental Science Division, Pacific Northwest National Laboratory, 2001.
Outstanding Performance Award, Environmental and Health Science Division, Pacific Northwest National Laboratory, 1998.
Technical Communication Award, East Tennessee Chapter, Society for Technical Communication, 1997.

Academic Award, Dept. of Physics, Chinese University of Hong Kong, 1983 and 1984

DISSERTATION COMMITTEES

Dissertation Committee of Shourong Wang, Institute of Atmospheric Physics, Chinese Academy of Sciences (1998 - 2001)
Formal Member of the Doctoral Dissertation Committee, National Climate Center, China Meteorological Administration (1999 - present)
Dissertation Committee of Jianzhong Guo, Department of Environmental and Civil Engineering, University of California - Berkeley (2001- 2006)
Dissertation Committee of Chunmei Zhu, Department of Environmental and Civil Engineering, University of Washington (2005 – 2007)
Dissertation Committee of Aditya Murthi, Department of Meteorology, Texas A&M University (2008 – 2009)
Dissertation Committee of Nicole Schiffer, Department of Atmospheric Sciences, University of Illinois, Urbana-Champaign (2009 – present)

SYNERGISTIC ACTIVITIES

Editor, Journal of Hydrometeorology, American Meteorological Society, since 2012
Member, Earth System Prediction Capability – Research, Development, Operation (ESPC – RDO) Interim Science Steering Group, 2011
Member, NRC study committee on “A National Strategy for Advancing Climate Modeling”, 2011 – 2012
Member, Organizing Committee, First Planning Workshop for Terrestrial Regional North American Hydroclimate Experiment (TRACE), April 18 – 20, 2011, Silver Spring, MD
Member, Department of Energy’s Office of Biological and Environmental Research Advisory Committee (BERAC), since 2009/12
Member, Department of Energy’s Office of Biological and Environmental Research Advisory Committee (BERAC) subcommittee on Energy Sustainability, 2009
Co-organizer, 2009 Japan-America Frontiers of Engineering Symposium, Sponsored by the National Academy of Engineering, November 9 – 11, 2009, Irvine, CA
Advisory Board, Idaho NSF EPSCoR on Climate Change and Water Resources, since 2009
Advisory Board, New Mexico NSF EPSCoR on Climate Change Impacts on New Mexico’s Mountain Sources of Water, since 2009
Advisory Board, Nevada NSF EPSCoR on Climate Change Science, Education, and Infrastructure, since 2008
Advisory Panel, TIIMES (The Institute for Integrative and Multidisciplinary Earth Studies), National Center for Atmospheric Research, 2008 - 2009
Organizer, North American Mountain Hydroclimate and Water Resources Workshop, co-sponsored by NOAA and NASA, October 17 – 19, 2007, Boulder, CO
Associate Editor, Journal of Geophysical Research – Atmosphere, since 2007
Chair, Science Panel, NOAA Climate Prediction Program for the Americas (CPPA), 2006 - 2010
Organizer, Workshop on Research Needs and Directions of Regional Climate Modeling Using WRF and CCSM, sponsored by NCAR, March 22-23, 2005, Boulder, CO
Research Applications Board Member, Weather Research and Forecasting model (WRF), since 2005
Chair, WRF Regional Climate Modeling Working Group, since 2004
Science Advisory Group, GEWEX Americas Prediction Project (GAPP) co-sponsored by NOAA/NASA, 2003 - 2005
National Advisory Panel, Aspen Global Change Institute, since 2005
Co-chair, Working Group on Applications of Climate Information to the Water Resource Sector, The 10th U.S.-Japan Workshop on Global Climate Change: Climate and Water, January 15-17, 2003, Irvine, CA
Organizer and Program Committee Chair, Workshop on “Regional Climate Research: Needs and Opportunities”, co-sponsored by the National Science Foundation and Department of Energy (DOE), April 2001, Boulder, CO

Chair, Science Working Group, NCAR Community Regional Climate Model (1999 – 2001)
 Consultant to the Zhejiang Provincial Meteorological Bureau, China Meteorological Administration (2003-2005)
 Task Leader, DOE-China Meteorological Administration Bilateral Agreement on Regional Climate Research Science Team (1996 – present)
 Served on Proposal Review Panels for EPA Science-To-Achieve Results (STAR) Grant Program, NASA Global Water and Energy Cycle (GWEC) Program, NOAA GEWEX Americas Prediction Project (GAPP) and Climate Dynamics and Experimental Prediction (CDEP) program, NASA Cloudsat panel, and the Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)
 Proposal review for NOAA, NASA, EPA, DOE, NSF, USGS, CEC, and CFCAS
 Journal review for *J. Clim.*, *Mon. Wea. Rev.*, *Geophysical Res. Letters.*, *Clim. Dynamics*, *J. Appl. Meteorol.*, *J. Hydrometeorology*, *Bull. Amer. Meteorol. Soc.*, *J. Geophys. Res.*, *Climatic Change*, *J. American Water Resources Assoc.*, *J. Hydrology*, *J. Meteor. Soc. of Japan*, *Annales Geophysicae*, *Interannual Journal of Climatology*, *Canadian Water Resources Journal*, *Cold Region Science and Technology*, *Adv. In Atmos. Sci.*, and *Terrestrial, Atmospheric and Oceanic Sciences*

PEER-REVIEWED PUBLICATIONS AND BOOK CHAPTERS

- Fan, J., D. Rosenfeld, Y. Deng, L.R. **Leung**, and Z. Li. 2012. "Potential Aerosols Indirect Effects on Atmospheric Circulation and Radiative Forcing" *Geophys. Res. Lett.*, submitted.
- Hagos, S., and L.R. **Leung**. 2012. "Large-Scale Environmental Variables and the Transition to Deep Convection in Cloud Resolving Model Simulations: A Vector Representation." *J. Advances in Modeling Earth Systems*, revised.
- Yoon, J., L.R. **Leung**, and J. Correia Jr. 2012. "Comparison of Cold Season Downscaled Seasonal Climate Forecasts for the U.S. Using Dynamical and Statistical Methods." *J. Geophys. Res.*, submitted.
- Li, Y., and L.R. **Leung**. 2012. "Potential Impacts of the Arctic on Interannual and Interdecadal Summer Precipitation in China." *J. Clim.*, submitted.
- Hou, Z., M. Huang, L.R. **Leung**, G. Lin, and D.M. Ricciuto. 2012. "Sensitivity of Surface Flux Simulations to Hydrologic Parameters Based on an Uncertainty Quantification Framework Applied to the Community Land Model." *J. Geophys. Res.*, submitted.
- Li, H., M.S. Wigmosta, H. Wu, M. Huang, Y. Ke, A.M. Coleman, and L.R. **Leung**. 2012. "A Physically Based Runoff Routing Model for Land Surface and Earth System Models." *J. Hydrometeorol.*, submitted.
- Done, J.M., G.J. Holland, C. Bruyere, L.R. **Leung**, and A. Suzuki-Parker. 2012. "Modeling High Impact Weather and Climate: The Tropical Cyclone Experience." *Bull. Amer. Meteorol. Soc.*, submitted.
- Lynn, B.H., L.R. **Leung**, A. Khain, and A. Givati. 2012. "Sensitivity of Precipitation Forecasts to Microphysical Parameterization and Grid-Resolution at Convection-Allowing and Cloud-Allowing Scales." *Mon. Wea. Rev.*, submitted.
- Zhao, C., X. Liu, and L.R. **Leung**. 2012. "The Impact of Great Basin Desert Dust on Summer Monsoon System in Southwestern United States." *Atmos. Chem. Phys.*, submitted.
- Yang, B., Y. Qian, G. Lin, L.R. **Leung**, and Y. Zhang. 2012. "Uncertainty Quantification and Optimization of Parameters in Kain-Fritsch Convective Parameterization Scheme in the WRF Regional Climate Model." *Atmos. Chem. Phys.*, revised.
- Balaguru, K., P. Chang, R. Saravanan, L.R. **Leung**, X. Zhao, M. Li, and J. Hsieh. 2012. "Effects of Ocean Barrier Layers on Tropical Cyclone Intensification." *PNAS*, submitted.
- Gao, Y., L.R. **Leung**, E.P. Salathé, F. Dominguez, B. Njissen, and D.P. Lettenmaier. 2012. "Southwestern U.S. Climate and Hydrologic Change From Regional and Global Climate Models." *Geophys. Res. Lett.*, revised.
- Zhong, S., X. Li, X. Bian, W.E. Heilman, L.R. **Leung**, and W.I. Gustafson. 2012. "Evaluation of Regional Climate Simulations of Hydroclimate and Climate Variability Over the Great Lakes Region." *Great Lakes Res.*, revised.
- Mearns, L.O., R. Arritt, S. Biner, M. Bukovsky, S. Sain, D. Caya, D. Flory, W. Gutowski, R. Jones, W. Moufouma-Okia, R. **Leung**, Y. Qian, J. Correia, Jr., S. McGinnis, L. McDaniel, A. Nunes,

- J. Roads, L. Sloan, M. Synder, G. Takle, R. Laprise. 2012. "The North American Regional Climate Change Assessment Program: Overview of Phase I Results." Bull. Amer. Meteorol. Soc., revised.
- Fan, J., L.R. **Leung**, Z. Li, H. Morrison, H. Chen, Y. Zhou, Y. Qian, and Y. Wang. 2012. "Aerosol Impacts on Clouds and Precipitation in Southeast China – Results From Bin and Bulk Microphysics." J. Geophys. Res., 117, D00K36, DOI:10.1029/2011JD016537.
- Hagos, S., and L.R. **Leung**. 2012. "On the Relationship Between Uncertainties in Tropical Divergence and the Hydrological Cycle in Global Models." J. Clim., doi: 10.1175/JCLI-D-11-00058.1.
- Zhang, Y., Y. Qian, V. Duliere, E.P. Salathe, and L.R. **Leung**. 2012. "ENSO Anomalies over the Western United States: Present and Future Patterns in Regional Climate Simulations." Climatic Change, DOI: 10.1007/s10584-011-0088-7.
- Li, H., M. Huang, M. Wigmosta, Y. Ke, A. Coleman, L.R. **Leung**, A. Wang, and D.M. Ricciuto. 2011. "Evaluating Runoff Simulations From the Community Land Model 4.0 Using Observations From Flux Towers and a Mountain Watershed." J. Geophys. Res., 116, D24120, doi:10.1029/2011JD016276.
- Hagos, S., and L.R. **Leung**. 2011. "Moist Thermodynamics of the Madden-Julian Oscillation in a Cloud Resolving Simulation." J. Clim., doi: 10.1175/2011JCLI4212.1.
- Hagos, S., L.R. **Leung**, and J. Dudhia. 2011. "Thermodynamics of Madden-Julian Oscillation in a Regional Model with Constrained Moistening." J. Atmos. Sci., doi: 10.1175/2011JAS3592.1.
- Bennartz, R., J. Fan, J. Rausch, L.R. **Leung**, and A.K. Heidinger. 2011. "Pollution From China Increases Cloud Droplet Number, Suppresses Rain Over the East China Sea." Geophys. Res. Lett., 38, L09704, doi:10.1029/2011GL047235.
- Zhao, C., X. Liu, L.R. **Leung**, and S. Hagos. 2011. "Radiative Impact of Mineral Dust on Monsoon Precipitation Variability over West Africa." Atmos. Chem. and Phys., 11, 1879-1893.
- Qian, Y., M.G. Flanner, L.R. **Leung**, and W. Wang. 2011. "Sensitivity Studies on the Impacts of Tibetan Plateau Snowpack Pollution on the Asian Hydrological Cycle and Monsoon Climate." Atmos. Chem. and Phys., 11, 1929-1948.
- Leung**, L.R., M. Huang, Y. Qian, and X. Liang. 2011. "Climate-Soil-Vegetation Control on Groundwater Table Dynamics and its Feedbacks in a Climate Model." Clim. Dyn., DOI 10.1007/s00382-010-0746-x.
- Qian, Y., D. Gong, and L.R. **Leung**. 2010. "Light Rain Events Change Over North America, Europe and Asia for 1973-2009." Atmos. Sci. Lett., DOI: 10.1002/asl.298.
- Gutowski, W.J., Jr., R.W. Arritt, S. Kawazoe, D.M. Flory, E.S. Takle, S. Biner, D. Caya, R.G. Jones, R. Laprise, L.R. **Leung**, L.O. Mearns, W. Moufouma-Okia, A.M.B. Nunes, Y. Qian, J.O. Roads, L.C. Sloan, and M.A. Snyder. 2010. "Regional, Extreme Monthly Precipitation Simulated by NARCCAP RCMs." J. Hydrometeorol., doi: 10.1175/2010JHM1297.1.
- Salathé, E.P., L.R. **Leung**, Y. Qian, and Y. Zhang. 2010. "Regional Climate Model Projections for the State of Washington." Climatic Change, 102(1-2), 51-75, doi:10.1007/s10584-010-9849-y.
- Banner, J.L., C.S. Jackson, L. Yang, K. Hayhoe, C. Woodhouse, L. Gulden, K. Jacobs, G. North, R. **Leung**, W. Washington, X. Jiang, and R. Casteel. 2010. "Climate Change Impacts on Texas Water: A White Paper Assessment of the Past, Present and Future and Recommendations for Action." Texas Water Journal, Vol 1, No. 1, 1-19.
- Zhao, C., X. Liu, L.R. **Leung**, B. Johnson, S. McFarlane, W.I. Gustafson, J.D. Fast, and R. Easter. 2010. "The Spatial Distribution of Dust and its Shortwave Radiative Forcing Over North Africa: Modeling Sensitivities to Dust Emissions and Aerosol Size Treatments." Atmos. Chem. and Phys., 10, 8821–8838.
- Murthi, A., K.P. Bowman, and L.R. **Leung**. 2010. "Simulations of the Precipitation Using NRCM and Comparisons with Satellite Observations and CAM: Annual Cycle." Clim. Dyn., DOI: 10.1007/s00382-010-0878-z.
- Chung, C.E., V. Ramanathan, G. Carmichael, S. Kulkarni, Y. Tang, B. Adhikary, L.R. **Leung**, and Y. Qian. 2010. "Anthropogenic Aerosol Radiative Forcing in Asia Derived From Regional Models With Atmospheric and Aerosol Data Assimilation." Atmos. Chem. and Phys., 10, 6007-6024, 2010, doi:10.5194/acp-10-6007-2010.

- Pallav, R., C. Zhang, M.W. Moncrieff, J. Dudhia, J. Caron, L.R. **Leung**, and C. Bruyere. 2010. "The Effects of the Mean State on the Initiation of the Madden-Julian Oscillation in a Nested Regional Climate Model." *Clim. Dyn.*, DOI: 10.1007/s00382-010-0859-2.
- Lu, N., T. Taylor, W. Jiang, C. Jin, J. Correia, L.R. **Leung**, and P.C. Wong. 2010. "Climate Change Impacts on Residential and Commercial Loads in the Western U.S. Grid." *IEEE Trans. on Power Systems*, 10.1109/TPWRS.2009.2030387.
- Weaver, C.P., X.-Z. Liang, J. Zhu, P.J. Adams, P. Amar, J. Avise, M. Caughey, J. Chen, R.C. Cohen, E. Cooter, J.P. Dawson, R. Gilliam, A. Gilliland, A.H. Goldstein, A. Gramsch, D. Grano, A. Guenther, W.I. Gustafson, R.A. Harley, S. He, B. Hemming, C. Hogrefe, H.-C. Huang, S.W. Hunt, D.J. Jacob, P.L. Kinney, K. Kunkel, J.-F. Lamarque, B. Lamb, N.K. Larkin, L.R. **Leung**, K.-J. Liao, J.-T. Lin, B.H. Lynn, K. Manomaiphiboon, C. Mass, D. McKenzie, L.J. Mickley, S.M. O'Neill, C. Nolte, S.N. Pandis, P.N. Racheria, C. Rosenzweig, A.G. Russell, E. Salathe, A.L. Steiner, E. Tagaris, Z. Tao, S. Tonse, C. Wiedinmyer, A. Williams, D.A. Winner, J.-H. Woo, S. Wu, D.J. Wuebbles. 2010. "A Preliminary Synthesis of Modeled Climate Change Impacts on U.S. Regional Ozone Concentrations." *Bull. Amer. Meteorol. Soc.*, doi:10.1175/2009BAMS2568.1.
- Wang, Y., C.N. Long, L.R. **Leung**, J. Dudhia, S. McFarlane, J.H. Mather, and X. Liu. 2009. "Evaluating Regional Cloud-permitting Simulations of the WRF Model for the Tropical Warm Pool International Cloud Experiment (TWP-ICE, Darwin 2006)." *J. Geophys. Res.*, 114, D21203, doi:10.1029/2009JD012729.
- Zhu, C., L.R. **Leung**, D. Gochis, Y. Qian, and D.P. Lettenmaier. 2009. "Evaluating the Influence of Antecedent Soil Moisture on Variability of the North American Monsoon Precipitation in the Coupled MM5/VIC Modeling System." *J. Advances in Modeling Earth Systems*, Vol. 1, Art. #13, 22 pp., doi:10.3894/JAMES.2009.1.13.
- Fan, J., T. Yuan, J. Comstock, S. Ghan, A. Khain, L.R. **Leung**, Z. Li, V. Martins, and M. Ovchinnikov. 2009. "Dominant Role by Vertical Wind Shear in Regulating Aerosol Effects on Deep Convective Clouds." *J. Geophys. Res.*, 114, D22206, doi:10.1029/2009JD012352.
- Khain, A.P., L.R. **Leung**, B.H. Lynn, and S.J. Ghan. 2009. "Effects of Aerosols on the Dynamics and Microphysics of Squall Lines Simulated by Spectral Bin and Bulk Parameterization Schemes." *J. Geophys. Res.*, 114, D22203, doi:10.1029/2009JD011902.
- Mearns, L.O., W. Gutowski, R. Jones, R. **Leung**, S. McGinnis, A. Nunes, and Y. Qian. 2009. "A Regional Climate Change Program for North America." *EOS*, 90:311-312.
- Wong, P.C., L.R. **Leung**, N. Lu, M.J. Scott, P. Mackey, H. Foote, B. Bragg, J. Correia, Jr., W. Jiang, Z.T. Taylor, Y.L. Xie, J. Xu, S. Unwin, and A. Sanfilippo. 2009. "Collaborative Visual Analytics in Multidisciplinary Technosocial Predictive Studies." *IEEE Computer Graphics and Applications*, September/October 2009, 58 – 68.
- Qian, Y., D. Gong, J. Fan, L.R. **Leung**, R. Bennartz, D. Chen, and W. Wang. 2009. "Heavy Pollution Suppresses Light Rain in China: Observations and Modeling." *J. Geophys. Res.*, 114, D00K02, doi:10.1029/2008JD011575.
- Qian, Y., S.J. Ghan, and L.R. **Leung**. 2009. Downscaling Hydroclimatic Changes Over the Western U.S. Based on CAM-Subgrid Scheme and WRF Regional Climate Simulations. *Int. J. Climatol.*, doi:10.1002/joc.1928.
- Qian, Y. W.I. Gustafson, Jr., L.R. **Leung**, and S.J. Ghan. 2009. "Effects of Soot-induced Snow Albedo Change on Snowpack and Hydrological Cycle in Western U.S. Based on WRF Chemistry and Regional Climate Simulations." *J. Geophys. Res.*, 114, D03108, doi:10.1029/2008JD011039.
- Leung**, L.R., and Y. Qian. 2009. "Atmospheric Rivers Induced Heavy Precipitation and Flooding in the Western U.S. Simulated by the WRF Regional Climate Model." *Geophys. Res. Lett.*, 36, L03820, doi:10.1029/2008GL036445.
- Huang, M., X. Liang, and L.R. **Leung**. 2008. "A Generalized Subsurface Flow Parameterization Considering Subgrid Spatial Variability of Topography and Recharge." *J. Hydrometeorol.*, 9(6), 1151–1171.
- Zhang, J., W.-C. Wang, and L.R. **Leung**. 2008. "Contribution of Land-atmosphere Coupling to Summer Climate Variability over the Contiguous United States." *J. Geophys. Res.*, 113, D22109, doi:10.1029/2008JD010136.

- Adhikary, B., S. Kulkarni, A. D' Allura, Y. Tang, L.R. **Leung**, Y. Qian, C.E. Chung, V. Ramanathan, and G.R. Carmichael. 2008. "A Regional Scale Chemical Transport Modeling of Asian Aerosols with Data Assimilation of AOD Observations using Optimal Interpolation Technique". *Atmos. Environ.*, 42, 8600–8615.
- Kennedy, T.L., D.S. Gutzler, and L.R. **Leung**. 2008. "Predicting Future Threats to the Long-Term Survival of Gila Trout Using a High-Resolution Simulation of Climate Change." *Climatic Change*, DOI 10.1007/s10584-008-9503-0.
- Zhang, Y., X.-M. Hu, L.R. **Leung**, and W.I. Gustafson. 2008. "Impacts of Regional Climate Change on Biogenic Emission and Air Quality." *J. Geophys. Res.*, 113, D18310, doi:10.1029/2008JD009965.
- Qian, Y., Q. Song, S. Menon, S. Yu, S.C. Liu, G. Shi, L.R. **Leung**, and Y. Luo. 2008. "Climate Impacts of Atmospheric Sulfate and Black Carbon Aerosols." In *Changes in the Human-Monsoon System of East Asia in the Context of Global Change*, edited by C.B. Fu, J.R. Freney, and J.W.B. Stewart, ISBN 978-981-283-241-2, World Scientific Publishing Company, Imperial College Press, 384pp.
- Lawford, R., and L.R. **Leung**. 2008. "North American Mountain Hydroclimate Workshop." *GEWEX Newsletter*, Vol 18(2), 17-18 (http://www.gewex.org/gewex_nwsltr.html).
- Adhikary, B., G.R. Carmichael, Y. Tang, L.R. **Leung**, Y. Qian, J.J. Schauer, E.A. Stone, and V. Ramanathan, and M.V. Ramana. 2007. "Characterization of Seasonal Cycle of South Asian Aerosols: A Regional-Scale Modeling Analysis." *J. Geophys. Res.*, 112, D22S22, doi:10.1029/2006JD008143.
- Tagaris, E., K. Manomaiphiboon, K.J. Liao, L.R. **Leung**, J.-H. Woo, S. He, P. Amar, and A.G. Russell. 2007. "Impacts of Global Climate Change and Emissions on Regional Ozone and Fine Particulate Matter Concentrations over the United States." *J. Geophys. Res.*, 112, D14312, doi:10.1029/2006JD008262.
- Gustafson, W.I., and L.R. **Leung**. 2007. "Regional Downscaling for Air Quality Assessment: A Reasonable Proposition?" *Bull. Amer. Meteorol. Soc.*, 88(8), 1215–1227.
- Qian, Y., and L.R. **Leung**. 2007. "A Long Term Regional Simulation and Observations of the Hydroclimate in China." *J. Geophys. Res.*, 112, D14104, doi:10.1029/2006JD008134.
- Qian, Y., W.-G. Wang, L.R. **Leung**, and D.P. Kaiser, 2007. "Variability of Solar Radiation under Cloud-Free Skies in China: The Role of Aerosols." *Geophys. Res. Lett.*, 34, L12804, doi:10.1029/2006GL028800.
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- Leung**, L.R., Y.-H. Kuo, and J. Tribbia. 2006. "Research Needs and Directions of Regional Climate Modeling Using WRF and CCSM." *Bull. Amer. Meteorol. Soc.*, 87(12), 1747-1751.
- Liang, X., L.R. **Leung**, M. Huang, Y. Qian, M.S. Wigmosta, G.B. Matanga, and D. Mathews. 2006. "PUB Working Group on Orographic Precipitation, Surface and Groundwater Interactions, and Their Impacts on Water Resources." In *Predictions in Ungaged Basins: Promises and Progress*, IAHS Publication 303, May 2006, Edited by Murugesu Sivapalan, Thorsten Wagener, Stefan Uhlenbrook, Erwin Zehe, Venkat Lakshmi, Xu Liang, Yasuto Tachikawa & Praveen Kumar, 520pp.
- Duffy, P. B., W. Arritt, J. Coquard, W. Gutowski, J. Han, J. Iorio, J. Kim, L. R. **Leung**, J. Roads, E. Zeledon. 2006. "Simulations of Present and Future Climates in the Western U.S. with Four Nested Regional Climate Models." *J. Clim.*, 19(6), 873-895.
- Qian, Y., D.P. Kaiser, L.R. **Leung**, and M. Xu, 2006. "More Frequent Cloud Free Sky and Less Surface Solar Radiation in China From 1955-2000." *Geophys. Res. Lett.*, 33, L01812, doi:10.1029/2005GL024586.
- Hogrefe, C., L.R. **Leung**, L.J. Mickley, S.W. Hunt, and D.A. Winner. 2005. "Considering Climate Change in Air Quality Management." *EM Magazine*, October 2005, 19-23.
- Leung**, L.R., and W.I. Gustafson, Jr. 2005. "Potential Regional Climate Change and Implications to U.S. Air Quality." *Geophys. Res. Lett.*, 32, L16711, doi:10.1029/2005GL022911.

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- Leung**, L.R., and Y. Qian. 2005. "Hydrologic Response to Climate Variability, Climate Change, and Climate Extreme in the U.S.: Climate Model Evaluation and Projections." In Regional Hydrological Impacts of Climatic Change – Impact Assessment and Decision Making, Wagener, T. et al. (Eds). IAHS Publication 295, pp37-44.
- Leung**, L.R. 2005. "Effects of Climate Variability and Change on Mountain Water Resources in the Western U.S." In Global Change and Mountain Regions: A State of Knowledge Overview, U.M. Huber, H.K.M. Bugmann, and M.A. Reasoner, (eds.), Springer, Dordrecht, pp355-366.
- Wang, Y.-Q., L.R. **Leung**, J.L. McGregor, D.-K. Lee, W.-C. Wang, Y. Ding, and F. Kimura. 2004. "Regional Climate Modeling: Progress, Challenges, and Prospects." Journal of the Meteorological Society of Japan, Vol 82(6), 1599-1628.
- Leung**, L.R., S. Zhong, Y. Qian, and Y. Liu. 2004. "Evaluation of Regional Climate Simulations of the 1998 and 1999 East Asian Summer Monsoon Using the GAME/HUBEX Observational Data." Journal of the Meteorological Society of Japan, Vol 82(6), 1695-1713.
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- Leung, L.R., and S.J. Ghan.** 1995. "A Subgrid Parameterization of Orographic Precipitation." Theor. Appl. Climatol 52:95-118.
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- Lin, R., H. Kreiss, W. Kuang and L.R. **Leung**. 1991: "A Study of Long Term Climate Change in a Simple Seasonal Nonlinear Climate Model." Climate Dynamics 6:35-41.
- Leung, L.R., and G.R. North.** 1990. "Information Theory and Climate Prediction." J. Clim. 3: 5-14.
- Lai, H., L.R. **Leung**, K. Lee and K. Chik. 1986. "Mechanical Analog of Optical Retarders." Am. J. Physics 54: 455-458.

KEYNOTE/INVITED PRESENTATIONS (Since 1999)

2012

- Leung, L.R., 2012. "Mega-Droughts of the Future: The Role of Biosphere-Atmosphere Feedbacks". Seminar at the Climate Forum, Jackson School of Geosciences, University of Texas at Austin, Austin, TX, February 20, 2012.
- Leung, L.R., 2012. "The Role of Complex Terrain on Precipitation Variability over Asia." Keynote talk at the Tibetan Plateau Surface-Troposphere-Stratosphere Interaction (STSI) Cooperation Research workshop, University of Texas at Austin, Austin, TX, February 20 – 21, 2012.

2011

- Leung, L.R., 2011. "Flux Coupling Approach and CLM-VIC Research." Invited talk at the EPA Workshop on Meteorology-Hydrology Linkage, January 5 - 6, 2011, Research Triangle, NC.
- Leung, L.R., M. Huang, Y. Qian, and X. Liang. 2011. "The Role of Land-Atmosphere Interactions in Droughts." Invited talk at the 91st American Meteorological Society Annual Meeting, January 24 – 27, 2011, Seattle, WA.
- Leung, L.R., 2011. "Science and Application of Regional Climate Models." Invited lecture at the Mathematical Science of Understanding and Predicting Regional Climate: A Workshop, March 7 – 11, 2011, Singapore.
- Leung, L.R., 2011. "Development of Frameworks for Robust Regional Climate Modeling." Invited talk at the ESCER Centre Annual Meeting on Climate and Hydrology, May 24 – 25, 2011, Montréal, Canada.
- Leung, L.R., 2011. "Simulations of floods and droughts in the western U.S. Under climate change." Invited talk at the US CLIVAR/NCAR ASP Researcher Colloquium on Climate Extremes, June 13 – 17, 2011, Boulder, CO.
- Leung, L.R., and S. Hagos. 2011. "Development of Frameworks for Robust Regional Climate Modeling: Results from WRF Aqua-Planet Experiments." Invited talk at the Global-to-Regional Climate Simulation: A Workshop in the Bridging Disciplines, Bridging Scale Series, August 3 – 5, 2011, Santa Fe, NM.

- Leung, L.R., 2011. "Modeling Precipitation and Aerosol Effects: From Idealized to Winter Storm Cases." Seminar at NOAA Earth System Research Laboratory, November 3, 2011, Boulder, CO.
- Leung, L.R., 2011. "Mega-Droughts of the Future: The Role of Biosphere-Atmosphere Feedbacks" Department seminar at Department of Atmospheric and Oceanic Sciences, University of California at Los Angeles, November 9, 2011, Los Angeles, CA.
- Leung, L.R., J. Fan, B. Lynn, D. Rosenfeld, J. Comstock, and K. Prather. 2011. "Modeling Aerosol Effects on Winter Storms: Case Studies from the SUPRECIP2 and CalWater Field Experiments in Central California." Invited talk at the 2011 American Geophysical Union Fall Meeting, December 5 – 9, 2011, San Francisco, CA.
- Leung, L.R., M. Huang, H. Li, Y. Ke, N. Voisin, Y. Liu, M. Wigmosta, and A. Coleman, 2011. "Modeling the Regional Water Cycle and its Interactions with Water Use, Land Use, and the Energy System." Invited talk at the 2011 American Geophysical Union Fall Meeting, December 5 – 9, 2011, San Francisco, CA.

2010

- Leung, L.R., 2010. "Downscaling Over Complex Terrain." Presented at the International Workshop on Downscaling over Japan, January 25 – 27, 2010, Tsukuba, Japan.
- Leung, L.R., 2010. "Hydrometeorological Modeling Over Complex Terrain: Lessons for SARR." Presented at the South Asian Regional Reanalysis Scoping Workshop, February 10 – 11, 2010, New Delhi, India.
- Leung, L.R., 2010. "Towards Modeling Climate Change Mitigation, Adaptation, and Impacts at the Regional Scale." Invited presentation at the DOE Integrated Climate Change Modeling Science Team Meeting, March 29 – April 2, 2010, Gaithersburg, MD.
- Leung, L.R., 2010. "Recent Developments in Regional Climate Modeling: The Role of the Land Surface." Department of Environmental and Civil Engineering Seminar, University of Washington, April 22, 2010, Seattle, WA.
- Leung, L.R., 2010. "Modeling Climate Change: The Role of Water in Global Climate Change and Simulating Regional Hydrologic Cycle Changes." Invited lecture at the Pan-American Study Institute (PASI), May 24 – May 28, 2010, San Diego, CA.
- Leung, L.R., 2010. "Overview of Coordinated Projects to Develop Regional Climate Change Scenarios." Invited presentation at the U.S. National Academy of Science Studies of Hydrological Aspects of Climate Changes, Water Management and Floods, November 16 – 18, Kiev, Ukraine.
- Leung, L.R., Y. Qian, and J. Correia, 2010. "Simulations of Extreme Events Using WRF Driven by Two GCMs." Invited talk at the 2010 AGU Fall Meeting, December 13 – 17, 2010, San Francisco, CA.

2009

- Leung, L.R., 2009. "Climate Change Science Research at PNNL: Regional Modeling and Hydrologic Impacts." Presented at the Seattle City Light, March 23, Seattle, WA.
- Leung, L.R., 2009. "Regional Modeling and its Role in Linking IPCC WG1 and WG2." Invited presentation at the National Academy of Science Climate Research Committee Spring Forum, May 27-28, Washington DC.
- Leung, L.R., 2009. "Black Carbon and Climate Change." Presented at the Puget Sound Clean Air Agency, July 13, Seattle, WA.
- Leung, L.R., 2009. "Review of the NRCM Approach, Current Status, and Future Priorities" Invited presentation at the Workshop on Simulating the Spatial-Temporal Patterns of Anthropogenic Climate Change, July 20-22, Santa Fe, NM.
- Leung, L.R., 2009. "Regional Climate Modeling for the PNW." Invited presentation at the 8th University of Washington Program on Climate Change Summer Institute "Climate Impacts on the Pacific Northwest: present, past and future", September 14-17, San Juan Island, WA.
- Leung, L.R., 2009. "Military Implications of Climate Change" Invited presentation at the 12th Annual Chiefs of Defense Conference, October 26 – 29, Honolulu, HI.

2008

- Leung, L.R., 2008. "Analysis of Model Biases in the WRF Tropical Channel Simulations and Implications to Climate Prediction." Invited presentation at the American Mathematical Society Annual Meeting (AMS-SIAM Special Session on Environmental Mathematics: Some Mathematical Problems on Climate Change and Geophysical Fluid Dynamics, January 6-9, San Diego, CA.
- Leung, L.R., 2008. "Regional Climate Modeling using the Weather Research and Forecasting (WRF) Model: Applications in the Tropics and the Western U.S." Seminar presentation at Desert Research Institute, February 22, 2008, Reno, NV.
- Leung, L.R., 2008. "Analysis of Biases in a Tropical Channel Simulation Based on the Weather Research and Forecasting (WRF) Model." Invited lecture at the Fourth International Centre for Theoretical Physics (ICTP) Workshop on the Theory and Use of Regional Climate Models: Applying RCMs to Developing Nations in Support of Climate Change Assessment and Extended-Range Prediction, March 3 – 7, 2008, Trieste, Italy.
- Leung, L.R., 2008. "Regional Climate Modeling using the Weather Research and Forecasting (WRF) Model: Applications in the Tropics and the Western U.S." Seminar presentation at Iowa State University, April 7, 2008, Ames, IA.
- Leung, L.R., 2008. "Downscaling for Assessing Climate Impacts: Examples and Future Directions." Plenary presentation at the Conference on Climate Change Impacts on Texas Water, April 28-30, 2008, Austin, TX.
- Leung, L.R., 2008. "Recent Climate Change Science Development and Projections of Climate Change on Water Resources in the Western U.S." Invited presentation at the National Association of Regulatory Utility Commissioners (NARUC) Summer Meeting, July 20 – 24, 2008, Portland, OR.

2007

- Leung, L.R., 2007. "Orographic Effects on Precipitation and its Interannual Variations." Invited presentation at the Symposium on Connections Between Mesoscale Processes and Climate Variability, 2007 Annual AMS Meeting, January 14-18, 2007, San Antonio, TX.
- Leung, L.R., 2007. "Regional Modeling Over Complex Terrains: Hydroclimate Challenges Over South Asia." Invited presentation at the Eighth Asian-Australian Monsoon Panel (AAMP) meeting, February 19-21, 2007, Honolulu, HI.
- Leung, L.R., 2007. "Overview of NRCM Research and Lessons Learned." Plenary presentation at the Community Climate System Model (CCSM) Annual Workshop, June 19-21, 2007, Breckenridge, CO.
- Leung, L.R., 2007. "Regional Patterns and Downscaling Approaches: Insights from IPCC WG1." Invited presentation at the Climate Change Impacts and Integrated Assessment (CCI/IA) Workshop, sponsored by the Energy Modeling Forum, Stanford University, July 23 – August 3, 2007, Snowmass, CO.
- Leung, L.R., 2007. "Modeling Aerosol Effects on Orographic Precipitation." Invited presentation at the Fourth Annual Climate Change Research Conference, September 10–13, 2007, Sacramento, CA.
- Leung, L.R., 2007. "Analysis of Model Biases in the WRF Tropical Channel Simulations." Plenary presentation at the Climate Change Prediction Program (CCPP) science team meeting, September 17-19, 2007, Indianapolis, IN.
- Leung, L.R., 2007. "Moving from Global to Regional and Local Scale Models." Keynote presentation at the Workshop on Future Priorities for the US Climate Change Science Program, organized by the National Academies Committee on Strategic Advice on the US Climate Change Science Program, October 15-17, 2007, Washington, DC.
- Leung, L.R., 2007. "Predicting Climate Variability and Change in the Mountains." Invited presentation at the North American Mountain Hydroclimate Workshop, co-sponsored by NOAA and NASA, October 17-19, 2007, Boulder, CO.

2006

- Leung, L.R., 2006. "Regional Climate Modeling: Recent Progress and Future Directions." Invited seminar at the Department of Geosciences, University of Houston, February 27, 2006, Houston, TX.
- Leung, L.R., 2006. "Regional Climate Modeling: Recent Progress and Future Directions." Invited seminar at the Department of Atmospheric Sciences, Texas A&M University, February 28, 2006, College Station, TX.
- Leung, L.R., 2006. "Progress and Update on the North American Regional Climate Change Assessment Program." Invited presentation at the Climate Change Prediction Program (CCPP) Science Team Meeting, April 24-26, 2006, Boston, MA.
- Leung, L.R., 2006. "Regional Climate Modeling." Invited lecture at the 2006 Unidata Users Workshop "Expanding the Use of Models as Educational Tools in the Atmospheric and Related Sciences", sponsored by the National Science Foundation, July 10 – 14, 2006, Boulder, CO.
- Leung, L.R., 2006. "Regional Climate Modeling: Recent Progress and Future Directions." Invited seminar at the Center for Ocean, Land, Atmosphere Studies (COLA), August 4, 2006, Calverton, MD.
- Leung, L.R., 2006. "CPPA Science Plan and Implementation Strategies." Plenary presentation at the Climate Prediction Program for the Americas (CPPA) principal investigator meeting, August 14 – 16, 2006, Tucson, AZ.
- Leung, L.R., 2006. "Assessing the Regional Impacts of Climate Change." Invited seminar at the Department of Civil and Environmental Engineering, Washington State University, October 30, 2006, Pullman, WA.
- Leung, L.R., 2006. "Predicting the Earth System Across Scales: An NRCM Approach to Addressing Climate Change and Hurricanes." Invited presentation at the Hurricanes and Climate Change Workshop, November 7-8, 2006, Boulder, CO.
- Leung, L.R., 2006. "Regional Modeling Over Complex Terrains: Hydroclimate Challenges Over South Asia." Invited presentation at the AGU Fall Meeting, December 11-15, 2006, San Francisco, CA.
- Leung, L.R., 2006. "A High-Resolution WRF Tropical Channel Simulation Driven by a Global Reanalysis." Invited presentation at the AGU Fall Meeting, December 11-15, 2006, San Francisco, CA.

2005

- Leung, L.R., 2005. "Downscaled Climate Scenarios: Use and Limitations." Invited presentation at the Symposium on Adapting to Climate Variability and Climate Change, AAAS Annual Meeting, February 17-22, 2005, Washington, D.C.
- Leung, L.R., 2005. "Modeling of Climate Variability and Change in the Western U.S." Invited presentation at the MTNCLIM 2005 Conference, 1-4 March, 2005, Chico Hot Springs, Pray, MT.
- Leung, L.R., and Y. Qian, 2005. "Dynamical Downscaling of Extended Weather Forecasts for Hydrologic Prediction in River Basins of the Western U.S." Invited presentation at the VIIth IAHS Scientific Assembly, April 3-9, 2005, Foz do Iguacu, Brazil.
- Leung, L.R., 2005. "Modeling of Climate Variability and Change in the Western U.S." Invited presentation at the Climate Change Symposium: Challenges & Solutions for California Agricultural Landscapes, May 12-13, 2005, U.C. Davis, CA.
- Leung, L.R., 2005. "Regional Climate Modeling Using WRF." Invited presentation at the Formosat-3/COSMIC Science Summer Camp and Colloquium, May 30 – June 3, 2005, Central Weather Bureau, Taipei, Taiwan.
- Leung, L.R., 2005. "Modeling of Regional Climate Variability and Change." Invited presentation at the National Taiwan University, June 2, Taipei, Taiwan.
- Leung, L.R., 2005. "Regional Climate Modeling." Invited presentation at the CLIVAR Asian-Australian Monsoon Panel Meeting, June 18-19, 2005, Orange County, CA.
- Leung, L.R., 2005. "A Summary of Regional Climate Modeling Research Using MM5 and WRF." Invited presentation at the Indo-US Workshop on High Performance Computing for Regional Weather and Climate, June 30 – July 1, 2005, Boulder, CO.

- Leung, L.R., 2005. "Regional Climate Modeling for the West Coast." Invited presentation at the Second Annual Climate Change Research Conference and First Scientific Conference, West Coast Governors' Global Warming Initiative, September 14–16, Sacramento, CA.
- Leung, L.R., Y. Qian, and W.I. Gustafson, 2005. "Evaluation of Regional Climate Simulations for Water Resources and Air Quality Assessment." Invited poster at the U.S. Climate Change Science Program Workshop on Climate Change in Support of Decision Making, November 14 – 16, Washington, DC.

2004

- Leung, L.R., and Y. Qian. 2004. "Downscaling of weather and climate forecasts in regions with complex orography." Invited presentation at the 18th Conference on Hydrology, 84th AMS Annual Meeting, January 11-15, 2004, Seattle, Washington.
- Leung, L.R. 2004. "Changes in Seasonal and Extreme Hydrologic Conditions of the Western U.S. by Mid-Century." Invited presentation at the AAAS Annual Meeting, February 11-16, 2004, Seattle, Washington.
- Leung, L.R., Y. Qian, V. Ramanathan, and C.E. Chung. 2004. "Simulating the Regional Climatic Effects of the Atmospheric Brown Cloud." Keynote presentation at the Third Workshop on Regional Climate Modeling, February 17-20, 2004, Honolulu, Hawaii.
- Leung, L.R., and Y. Qian. 2004. "Climate Downscaling in Regions of Complex Terrain." Invited poster presentation at the Mountain Climate Sciences Symposium co-sponsored by NOAA, USDA Forest Service, USGS, and others, May 25-27, 2004, Lake Tahoe, California.
- Leung, L.R., 2004. "Effects of Greenhouse Gases and Aerosols on Regional Hydrological Cycle." Invited presentation at the Workshop on Aerosols and the Hydrological Cycle, Aspen Global Change Institute, co-sponsored by NASA, NOAA, and NSF, July 11-17, 2004, Aspen, Colorado.
- Leung, L.R. 2004. "Hydroclimatology of Orographic Systems." Plenary presentation at the GEWEX Americas Prediction Project (GAPP) Principal Investigator Meeting, August 30-31, 2004, Boulder, Colorado.
- Leung, L.R. 2004. "Climate Impacts on the Water Cycle." Keynote presentation at the NSF/DOE Workshop on Water: Challenges at the Intersection of Human and Natural Systems co-sponsored by NSF and DOE, September 16-17, 2004, Richland, Washington.
- Leung, L.R. 2004. "How Well Can We Simulate the Regional Hydrological Cycle and Its Sensitivity to Climate Change?" Invited presentation at the Black Carbon Emissions and Climate Change: A Technical Workshop co-sponsored by EPA, NREL, Engine Manufacturers Association, American Petroleum Institute, and Diesel Technology Forum, October 13-15, San Diego, California.
- Leung, L.R. 2004. "On the Capability of Dynamical Downscaling for Water Resources Management." Invited presentation at the Workshop on Application of Climate Models to Water Resources Management sponsored by the Canadian Climate Impacts and Adaptation Research Network (C-CIARN), November 18-19, Victoria, BC, Canada.

2003

- Leung, L.R. 2003. "On the Development of Regional Climate Change Scenarios for Assessing Hydrologic Impacts." Invited presentation at the 10th U.S.-Japan Workshop on Global Climate Change: Climate and Water, January 15-17, 2003, Irvine, California.
- Leung, L.R., S. Waichler, M. Wigmosta, S. Zhong, X. Liang, and Y. Liu. 2003. "Evaluation of Land Surface and Regional Climate Simulations of the East Asian Summer Monsoon. Keynote presentation at the Second Workshop on Regional Climate Modeling for the Monsoon System, March 4-6, 2003, Yokohama, Japan.
- Leung, L.R. 2003. "Orographic Effects on Cold Season Hydrometeorological Processes in the Western Cordillera." Invited presentation at the plenary session of the GAPP Principal Investigator Meeting, July 21-23, 2003, Seattle, Washington.
- Leung, L.R. 2003. "Modeling of Cold Season Hydrometeorological Processes in the Western Cordillera." Invited plenary presentation at the GAPP Mountain Workshop, July 24, 2003, Seattle, Washington.

- Leung, L.R. 2003. "Investigations of the Hydroclimate of the Western U.S. Using a Regional Climate Model." Invited presentation at the NCAR MMM Division Seminar, August 7, 2003, Boulder, Colorado.
- Leung, L.R. 2003. "Regional Climate Modeling of Climate Variability and Change." Invited presentation at the Zhejiang Province Meteorological Bureau, October 23, 2003, Hangzhou, China.
- Leung, L.R. 2003. "Regional Climate Modeling of Climate Variability and Change." Invited presentation at the Korea Meteorological Administration, October 30, 2003, Seoul, Korea.
- Leung, L.R. 2003. "Regional Climate Modeling of Climate Variability and Change." Invited presentation at the National Climate Center, China Meteorological Administration, October 31, 2003, Beijing, China.
- Leung, L.R. 2003. "Mid-Century Climate Change Effects on Water Resources in the Western U.S." Invited presentation at the NARUC Annual Conference, November 16-20, 2003, Atlanta, Georgia.

2002

- Leung, L.R. 2002. "On the Development of Regional Climate Change Scenarios." Invited presentation at the U.S. Workshop on Climate Projections, Uncertainty, and Scenarios for Impact Assessment, July 17-19, 2002, Boulder, Colorado.
- Leung, L.R., M.S. Wigmosta, and L.W. Vail. 2002. "Use of Seasonal Climate Forecasts for Water Resources Management in the Tennessee River." Invited presentation at the GEWEX-IAHS Workshop, July 22-26, 2002, Dresden, Germany.
- Leung, L.R. 2002. "Mid-Century Ensemble Regional Climate Change Scenarios for the Western United States." Invited presentation at the Second ICTP Conference on Detection and Modeling of Regional Climate Change, September 20 – October 4, 2002, Trieste, Italy.

2000

- Leung, L.R., and M.S. Wigmosta. 2000. "The Roles of Subgrid Topography on Land-Atmosphere Interactions." Invited presentation at the 11th Symposium on Global Change, January 12-16, 2000, Long Beach, California.

1999

- Leung, L.R. 1999. "A Regional Climate-Hydrology Modeling System for Climate and Water Resources Applications." Invited presentation at the U.S.-China Workshop on Water Resources Management, April 19-23, 1999, Tucson, Arizona.
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